

SEMINAR AGENDAS
RISK AND HUMAN AND ORGANIZATIONAL FACTORS
SPONSORED BY, THE SHIP STRUCTURE COMMITTEE (SSC)

(Please use the blue text links that are booked marked and linked for your convenience.)

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May Seminar:

Thursday and Friday, May 10 and 11, 2001
At the Federal Aviation Administration
Headquarters, Building 10-A, 800
Independence Avenue, SW, Washington,
DC 20591.

June Seminar:

Thursday and Friday, May 10 and 11, 2001
At the Federal Aviation Administration
Headquarters, Building 10-A, 800
Independence Avenue, SW, Washington,
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MAY 10th & 11th, 2001 Agenda Outline

Basic Risk-based Decision Making

David A. Walker, Senior Risk/Reliability Engineer, EQE International, Inc

- ◆ *Safety/risk-based decision-making process*
- ◆ *Qualitative and quantitative information*
- ◆ *Common pitfalls*

Risk Assessment

Thomas A. Mazzuchi, Ph.D., Professor, School of Engineering and Applied Science, The George Washington University

- ◆ *Historical perspective*
- ◆ *Overview of the tools*
- ◆ *Lessons learned from actual risk assessments*

Risk Management

Paul S. Fischbeck, Ph.D., Associate Professor, Department of Engineering and Public Policy and Department of Social and Decision Sciences, Carnegie Mellon University

- ◆ *Historical perspective*
- ◆ *Risk management methodologies*
- ◆ *Marine Board study on environmental performance of tanker design*

Risk Perception

Paul Slovic, Ph.D., President of Decision Research and Professor, Department of Psychology, University of Oregon

- ◆ *Psychometric paradigm*
- ◆ *How safe is safe enough?*
- ◆ *Risk conflicts*

Decision Analysis

Ralph L. Keeney, Ph.D., Professor, Center for Telecommunications Management, Marshall School of Business, University of Southern California

- ◆ *Fundamentals of decision analysis*
- ◆ *Systematic decision process*
- ◆ *The art of decision analysis*

Risk Communication

Kimberly M. Thompson, Sc.D., Assistant Professor, Center for Risk Analysis, School of Public Health, Harvard University

- ◆ *Understanding risk in a complex world*
- ◆ *Talking about numbers*
- ◆ *Roles of media*

June 7th & 8th, 2001 Agenda Outline

Managing Technological and Social Systems

Edward Wenk Jr., Ph.D., Emeritus Professor of Engineering, Public Affairs and Social Management of Technology, University of Washington

- ◆ *First principles*
- ◆ *Case studies*
- ◆ *Lessons for the future*

Basic Human and Organizational Factors

Karlene H. Roberts, Ph.D., Professor, Walter A. Haas School of Business, University of California, Berkeley

- ◆ *Accident prevention*
- ◆ *High-reliability organizations*
- ◆ *Case studies*

Physical Ergonomics

Gerald E. Miller, CPE, President, G.E. Miller & Associates, Tucson, Arizona

- ◆ *Human factors engineering*
- ◆ *Ergonomic design*
- ◆ *Reducing physical-ergonomic casualties at sea*

Organizational Design and Management

Hal W. Hendrick, Ph.D., CPE, DABFE, Emeritus Professor of Human Factors and Ergonomics, University of Southern California, Los Angeles, California, and Principal, Hendrick and Associates

- ◆ *Macroergonomics*
- ◆ *Sociotechnical systems model*
- ◆ *Case studies*

Cognitive Ergonomics

Erik Hollnagel, Ph.D., Professor, Department of Computer and Information Science, University of Linköping, Sweden

Accidents and “human error”

Accident models – from root causes to latent conditions

Avoiding accidents

May 10th & 11th Detailed Agenda:

DAY 1 (May)

Time	Presentation and Presenter
0730	Registration
0800	Welcome and Opening Remarks by Ship Structure Committee (SSC) member
0825	Introduction of first speaker by SSC member
0830	<p>Presentation: Basic Risk-based Decision Making</p> <p><i>This presentation examines the safety/risk-based decision-making process and the qualitative and quantitative information most often found useful in this process. The presentation also examines the common pitfalls that lead decision makers to request the wrong analyses and lead analysts to provide inadequate information.</i></p> <ol style="list-style-type: none"> 1. Overview of problems and solutions 2. Types of decisions 3. Decision information characteristics 4. The process <p>Presenter: David A. Walker, Senior Risk/Reliability Engineer, EQE International, Inc. (an ABS Group company), and Senior Instructor, Process Safety Institute</p>
1040	Break
1055	Introduction of second speaker by SSC member
1100	<p>Presentation: Risk Assessment</p> <p><i>This presentation introduces the maritime decision maker to the purpose, terminology, tools, and procedures used in risk assessment. Examples from actual maritime risk assessments in Prince William Sound, New Orleans, and Seattle will be included in the discussion.</i></p> <ol style="list-style-type: none"> 1. Historical perspective of risk assessment 2. Defining risk 3. Framework for risk assessment <ul style="list-style-type: none"> • Preventing unwanted events, exposures, and consequences • Mitigating unwanted consequences 4. Overview of the tools of risk assessment <ul style="list-style-type: none"> • Modeling approaches • Probability • Utility and multi-attribute utility • Data analysis • Use of expert judgment 5. Conducting the risk assessment <ul style="list-style-type: none"> • Dos and don'ts • Some lessons learned <p style="padding-left: 40px;">The presentation will be in two parts, which will be separated by a lunch break.</p> <p>Presenter: Thomas A. Mazzuchi, Ph.D., Professor, School of Engineering and Applied Science, The George Washington University, Washington, DC</p>
1200	Lunch
1300	Presentation: Risk Assessment (continued)

DAY 1 (May continued)

Time	Presentation and Presenter
1400	Break
1415	Introduction of third speaker by SSC member
1420	<p>Presentation: Risk Management</p> <p><i>This presentation describes risk-based methodologies used in a recent study, which was commissioned by the U.S. Coast Guard and completed by the Marine Board of the National Academy of Sciences, on evaluating the environmental performance of alternative oil tanker designs. The presentation uses environmental performance of tanker design to show practical application of risk management for maritime decision makers.</i></p> <ol style="list-style-type: none">1. Introduction and background<ul style="list-style-type: none">• Historical data• Regulatory setting for selecting tanker designs• Previous comparison methodologies2. Selecting an impact measure<ul style="list-style-type: none">• Environmental and economic impacts of different oil spills3. Outflow calculations for groundings and collisions4. Comparison of designs5. Policy implications <p>A 10-minute break will occur midway through the discussion.</p> <p>Presenter: Paul S. Fischbeck, Ph.D., Associate Professor, Department of Engineering and Public Policy and Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, Pennsylvania</p>
1630	Summary by SSC member
1645	Adjourn

DAY 2 (May)

Time	Presentation and Presenter
0730	Registration
0800	Recap of Day One by SSC member
0815	Introduction of fourth speaker by SSC member
0820	<p>Presentation: Risk Perception</p> <p><i>This presentation will address lessons learned from the chemical and nuclear industries regarding the public's understanding of risk. The presentation will conclude with a discussion on how these concepts can be used by maritime decision makers.</i></p> <ol style="list-style-type: none"> 1. Psychometric paradigm – a taxonomy of hazards to predict risk response 2. How safe is safe enough? – patterns of acceptable risk/benefit trade-off 3. Modeling impact of unfortunate events – forecasting public acceptance 4. The influence of emotion and affect on risk-based decisions 5. Risk conflicts – rational systems versus experiential systems 6. Choosing risk metrics 7. Informing and educating the public about risk 8. Technological stigma <p>Presenter: Paul Slovic, Ph.D., President of Decision Research and Professor, Department of Psychology, University of Oregon, Eugene, Oregon</p>
1030	Break
1045	Introduction of fifth speaker by SSC member
1050	<p>Presentation: Decision Analysis</p> <p><i>This presentation provides the maritime decision maker with a practical guide to making better decisions. The systematic process described in the presentation is equally useful in personal matters as it is in business decisions.</i></p> <ol style="list-style-type: none"> 1. Fundamental steps of decision analysis <ul style="list-style-type: none"> • Structuring the decision • Describing consequences of the alternatives • Qualifying preferences for consequences • Analyzing the alternatives 2. Implementing a decision analysis <ul style="list-style-type: none"> • Identifying objectives and performance measures • Gathering needed information 3. Applications of decision analysis <ul style="list-style-type: none"> • The art of doing a decision analysis • Interpreting and using a decision analysis <p>The presentation will be in two parts, which will be separated by a lunch break.</p> <p>Presenter: Ralph L. Keeney, Ph.D., Professor, Center for Telecommunications Management, Marshall School of Business, University of Southern California, Los Angeles, California</p>
1150	Lunch
1300	Presentation: Decision Analysis (continued)

DAY 2 (May continued)

Time	Presentation and Presenter
1400	Break
1415	Introduction of sixth speaker by SSC member
1420	<p>Presentation: Risk Communication</p> <p><i>This presentation builds on key points made in earlier presentations and discusses ways to communicate risk that facilitate risk-based decisions.</i></p> <ol style="list-style-type: none"> 1. Understanding risk in a complex world <ul style="list-style-type: none"> • Types of risk • Fitting risk assessment, perception, management, and communication together • Rules of the decision-making game – involving stakeholders 2. Variability and uncertainty 3. Talking about numbers <ul style="list-style-type: none"> • Numeracy • Absolute and relative risk • Small probabilities in context • Timing of benefits and costs • Tools for improving understanding 4. Role of the media and how media cover risk issues 5. What we have learned about risk communication during the past 30 years 6. The future of risk communication in a high-tech society <ul style="list-style-type: none"> • Opportunities with Internet technology • Expectations for involvement • Spanning the technical and emotional issues • Team building <p>A 10-minute break will occur midway through the presentation.</p> <p>Presenter: Kimberly M. Thompson, Sc.D., Assistant Professor, Center for Risk Analysis, School of Public Health, Harvard University, Boston, Massachusetts</p>
1630	Summary by SSC member
1645	Adjourn

June 7th & 8th Detailed Agenda:

DAY 1 (June)

Time	Presentation and Presenter
0730	Registration
0800	Welcome and Opening Remarks by SSC member
0825	Introduction of first speaker by SSC member
0830	<p>Presentation: Managing Technological and Social Systems</p> <p><i>This presentation underscores the principles that govern risk-based decisions. Several maritime case studies are used to show how these principles affected outcomes.</i></p> <ol style="list-style-type: none"> 1. Introduction – a search for common elements within diverse technologies 2. First principles <ul style="list-style-type: none"> • How safe is safe? • Cultural influences • Human and organizational error • Organizational influences on risk taking and human error • Managing risk in social, economic, and environmental contexts • Balancing public and private interests 3. Case studies <ul style="list-style-type: none"> • Designing the first nuclear submarine • Passenger safety on ferry systems • System failures contributing to the consequences of the Exxon Valdez • Fishing vessel safety 4. Lessons for the future <ul style="list-style-type: none"> • Politics of risk – minding the public interest • More tools for risk management • Government and regulation • Making safety profitable <p style="text-align: right;">A 10-minute break will occur midway through the discussion.</p> <p>Presenter: Edward Wenk Jr., Ph.D., Emeritus Professor of Engineering, Public Affairs and Social Management of Technology, University of Washington, Seattle, Washington</p>
1040	Break

DAY 1 (June continued)

Time	Presentation and Presenter
1055	Introduction of second speaker by SSC member
1100	<p>Presentation: Basic Human and Organizational Factors</p> <p><i>This presentation discusses accident causation and prevention within human-centered systems and how to implement organizational controls.</i></p> <ol style="list-style-type: none"> 1. Teams and risk 2. Modeling accident causation 3. The air transportation industry experience 4. Accident prevention – a hierarchical systems approach <ul style="list-style-type: none"> • Physical ergonomics • Individual behaviors • Team and group behaviors • Organization and management • Societal and institutional pressures 5. High reliability organization – research findings on how to be one 6. A case study – Oyster and the U.S.S. Constellation <p>The presentation will be in two parts, which will be separated by a lunch break.</p> <p>Presenter: Karlene H. Roberts, Ph.D., Professor, Walter A. Haas School of Business, University of California, Berkeley, California</p>
1200	Lunch
1300	Presentation: Basic Human and Organizational Factors (continued)
1400	Break
1415	Introduction of third speaker by SSC member
1420	<p>Presentation: Physical Ergonomics</p> <p><i>This presentation describes how the application of physical ergonomics to the design of ships can reduce human error on the part of a ship's crew.</i></p> <ol style="list-style-type: none"> 1. What is human factors engineering (HFE)? What role does physical ergonomics play in HFE? 2. How significant is physical ergonomics in affecting human error at sea? What human behavioral patterns are most influenced by poor physical ergonomic design of ships? 3. Examples of typical physical ergonomic deficiencies found on ships 4. HFE approach to reducing human errors on ships 5. Introduction to physical ergonomic design standards/guidelines <ul style="list-style-type: none"> • ASTM F1166 • ABS guidelines • IMO guidelines for design of machinery rooms 6. Why has physical ergonomics not been systematically included in ship designs to date? Who should do the integration of physical ergonomics into ship design? 7. The role of government in reducing physical ergonomic-induced casualties at sea 8. What does it cost to integrate physical ergonomics into ship design? <p>Presenter: Gerald E. Miller, CPE, Tucson, Arizona</p>
1630	Summary by SSC member
1645	Adjourn

DAY 2 (June)

Time	Presentation and Presenter
0730	Registration
0800	Recap of Day One by SSC member
0815	Introduction of fourth speaker by SSC member
0820	<p>Presentation: Organizational Design and Management</p> <p><i>This presentation provides a basic understanding of macroergonomics and why it can achieve dramatic improvements in safety and productivity. Maritime decision makers will be introduced to basic analysis tools that can be used to measure the adequacy of their organization's work system design and how to improve it.</i></p> <ol style="list-style-type: none"> 1. An overview of macroergonomics – definition and short history 2. The structural dimensions of work systems – complexity, formalization, and centralization 3. The pitfalls of conventional approaches to work system design (based on analyses of over 200 organizational units in a variety of industries) 4. The sociotechnical systems model of work systems <ul style="list-style-type: none"> • Tavistock studies • Sociotechnical system elements • Sociotechnical systems principles • Organizational synergism and harmonization 5. Sociotechnical system analysis of an organization to determine its optimal work system structure <ul style="list-style-type: none"> • Technological subsystem analysis • Personnel subsystem analysis • Analysis of the organization's critical external environment • Integrating the results to derive an effective work system design 6. The relation of micro- to macroergonomics in work system design 7. Case studies illustrating effective applications of macroergonomics <ul style="list-style-type: none"> • Deer and Company • Red Wing Shoes • Chevron • LL Bean • Union Pacific • C141 aircraft • Designing a university college with 30 worldwide education centers • Lessons learned from the above that are applicable to the maritime industry 8. Class exercise: macroergonomic analysis of an actual organization to determine its optimal work system structure <p>Two 15-minute breaks will occur during the presentation.</p> <p>Presenter: Hal W. Hendrick, Ph.D., CPE, DABFE, Emeritus Professor of Human Factors and Ergonomics, University of Southern California, Los Angeles, California, and Principal, Hendrick and Associates, Greenwood Village, Colorado</p>
1150	Lunch

DAY 2 (June continued)

Time	Presentation and Presenter
1255	Introduction of fifth speaker by SSC member
1300	<p>Presentation: Cognitive Ergonomics</p> <p><i>This presentation challenges the notion that human error is a unique and identifiable cause of accidents. The presentation provides a more contemporary view that accidents express the variability in human and system performance. The speaker will present a new approach to accident analysis and prevention based on performance variability.</i></p> <ol style="list-style-type: none">1. Characterisation of classical ergonomics2. Characterisation of cognitive ergonomics3. Accident models – from root causes to latent conditions4. Accidents and “human error”5. Blunt end causes and performance variability<ul style="list-style-type: none">• Accidents result from the unintended mixture of normal performance variability in a system• Three approaches to accident management: error reduction, elimination of deviations, and control of variability6. Avoiding accidents: barriers and defences <p>Two 15-minute breaks will occur during the presentation.</p> <p>Presenter: Erik Hollnagel, Ph.D., Professor, Department of Computer and Information Science, University of Linköping, Linköping, Sweden</p>
1630	Summary and Closing by SSC member
1645	Adjourn